The Correlation of Geological Faunas: A Contribution to Devonian Paleontology. By HENRY SHALER WILLIAMS. [Bulletin of the United States Geological Survey, No. 210.] Washington, 1903.

IN the investigation of geologic problems concerned with correlation, two fundamentally different concepts must be kept continually in mind. The first of these has to do with rock strata, the media in which fossil organisms are preserved, and the classification of formations; the second has to do with fossil faunas or assemblages of organisms preserved in the rocks, and the classification of time periods. In the broad correlation of geologic formations the data furnished by the faunas are of prime importance, and too much cannot be said of the value of exhaustive researches upon fossil faunas as faunas.

The paper by Professor Williams on *The Correlation of Geological Faunas* is essentially a treatise upon the methods of investigation of fossil faunas, in which the Middle Devonian fauna of the New York province, characterized by *Tropidoleptus carinatus*, is especially used for illustration.

In the first two chapters of the work, "The Principles of Correlation" and the "Geological Expression of Faunal Migrations" are discussed in a manner applicable to any problem involving the study of fossil faunas. Chapter 3 is devoted to an application of the principles discussed in the preceding chapters, to an investigation of the history of the *Tropidoleptus carinatus* fauna. In treating of the "Shifting of Faunas" in chap. 4, illustrations are again drawn from the Devonian faunas of the New York province. The principles involved, and the effect of the shifting as expressed in the faunas themselves, are fully discussed. In considering the "equivalency" of formations in chap. 5, examples are taken from the correlation of the Devonian formations of New York and Ohio. The sixth and last chapter of the treatise is devoted to the "Bionic Value of Fossils." The application of the data furnished by species, genera, etc., of organisms, for the classification, not of rock formations, but of time periods, is discussed, and the chapter closes with the statement of a proposed "bionic time scale."

In this paper Professor Williams has assembled the more important results, both material and philosophical, which he has secured in the course of his long-continued investigations of the Middle and Upper Devonian faunas of New York. Many of these results have been previously published in various shorter papers, but here they are for the first time brought together in compact form. The paper is full of suggestions and should be studied by every student of fossil faunas.

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